Public Works Perspective on Managing Microtrenching in the Right-of-Way – City of San Diego

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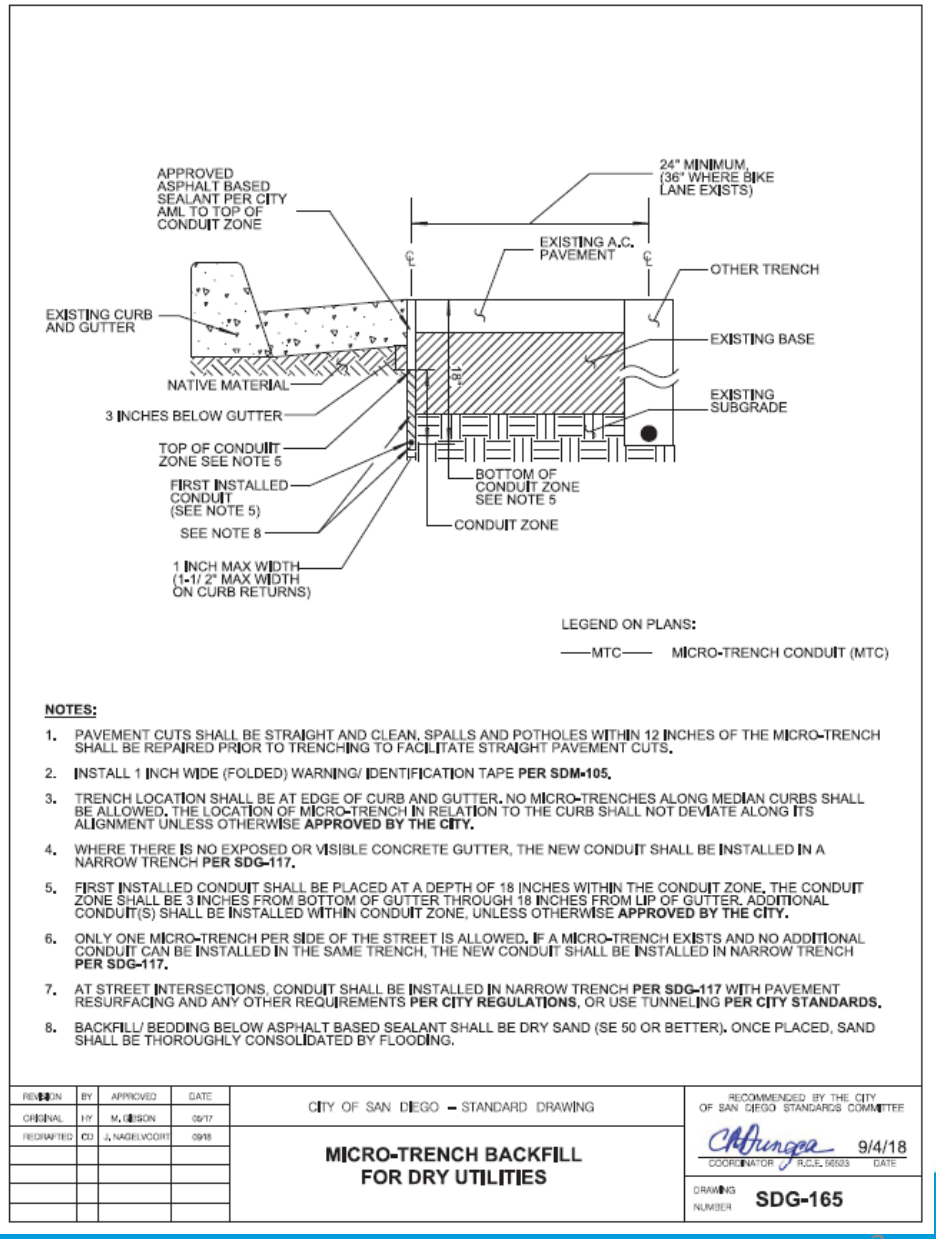
The City of SAN DIEGO

Objectives

1. History- Why the need
2. Challenges with creating a standard
3. Method for creating a standard
4. Summarizing key components of SDG 165
5. Lessons Learned
6. Questions

History – Why the need?

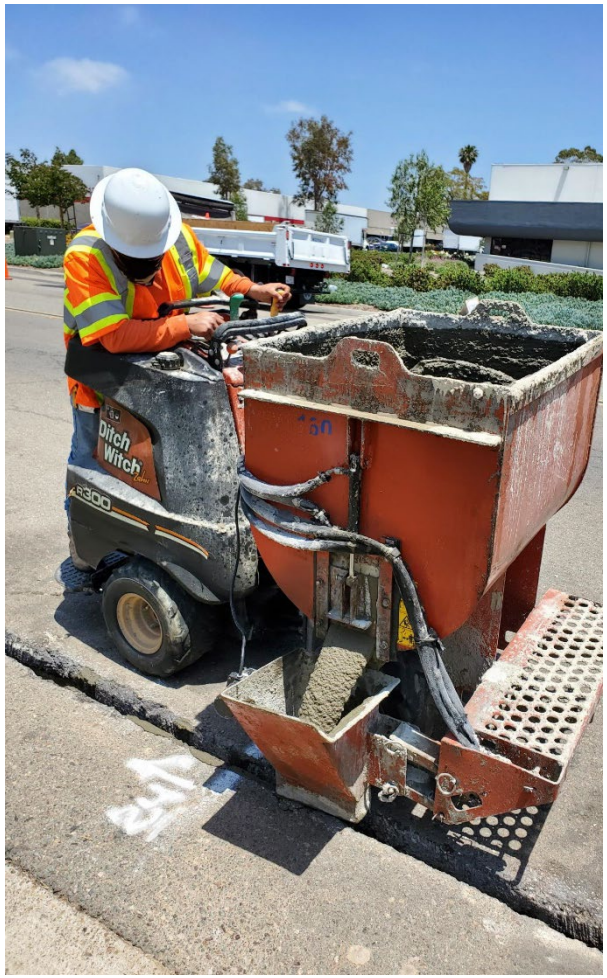
1. Early 2000's direct bury wire was below pavement section 4"-8", often times sawcut through and damaged wire
2. 2016-2017 committee formed to investigate micro-trenches alternatives. Google was main vendor participating. Result was the Creation of SDG 165 – w/1" wide trench
   - SDG 165 standard was never used between 2017-2021
3. 2020 "CA Broadband For All" program encouraged City's to begin developing programs to provide 5G service to all communities
4. City of SD and ISPs worked to develop standards to increase equity w/in City by providing better internet access to underserved communities; to reduce impacts to public streets & the community; and to reduce permit review and approval times
5. April 2021 to October 2022 CSD worked with ISPs to create a standard allowing micro-trenches 1" min width to 2-1/2" max



Method for Creating a Standard

1. Met with ISPs
2. ISPs provided a proposed standard
3. Determine key factors –
    1. Width- min and max
    2. Depth- min and max
    3. Separation between pavement and top of pipe
    4. Size of conduit
    5. Separation between trenches
    6. Number of conduits
4. City team review 7 local standards and compare key factors
5. Speak with other agencies – clarify questions from 7 agencies
6. Review and Evaluate backfill material mix design performance for backfill and bicycle safety
7. Perform 2 pilots

Challenges with Creating Standards



1. Balance between production from ISPs and protection of owner's facilities
2. Limited availability based on quantity per side of street
    1. Previous standard 1 micro-trenches per side of street versus current requirement of 2' edge to edge from any adjacent utility
    2. Old Standard provided for only 2 trenches per street, while the new standard does not restrict quantity and is based on available space
    3. New standard allows for competition of different ISPs
3. Daily Production for ISPs is affected by depth and width of trench, along with underlying materials encountered
    1. Original Standard required 18" depth with 6" cover from bottom of pavement to top of pipe. New Standard requires 12" to top of pipe with 4" between pavement and top of pipe
    2. Agreed on Width of 1-2 ½"
    3. Agreed on max conduit OD 2"
    4. Agreed on no limit of conduits in trench, as this is means and methods and don't want to limit advances in technology

Standard SDG 165 PG 1 and 2

NOTES:

1. CLEARENCE SEPARATIONS BETWEEN DRY AND WET UTILITIES SHALL BE MAINTAINED PER CALFORNIA PUBLIC UTILITY CODE GENERAL ORDER 128.
2. **PERMITTING REQUIREMENTS:** ALL MICROTRENCH PERMITS REQUIRE A DEVELOPMENT SERVICES DEPARTMENT DIGITAL SUBMISSION WITH A GEOSPATIAL ALIGNMENT PER DEVELOPMENT SERVICES DEPARTMENT FORMAT REQUIREMENTS.
3. **CONDUIT ANCHORING**: CONTRACTOR MUST PROVIDE THEIR METHOD OF WEIGHING / ANCHORING DOWN CONDUITS IN THEIR PERMIT. TO PREVENT CONDUITS FROM FLOATING, AND TO MAINTAIN REQUIRED DEPTH FOR TOP OF CONDUIT.
4. **MICROTRENCHING USAGE:** MICROTRENCHING PER SDG-165A AND / OR SDG-165B SHALL BE ON ASPHALT STREETS ONLY. MICROTRENCHING SHALL NOT BE PERMITTED IN OR THROUGH EXISTING CONCRETE PAVED STREETS, PARKWAYS, CURB, GUTTER, CROSS GUTTER, BUS PAD, SIDEWALK, FLOATING CURB EXTENSION, BUS BULB, TRUCK PILLOW, RAISED CROSSWALK, ISLAND, MINI- ROUNDABOUT, OR SIMILAR ELEMENTS. MICROTRENCHING MAY BE PERMITTED, AT THE CITY'S DISCRETION, IN OR THROUGH EXISTING IMPROVEMENTS AND SPECIAL PAVEMENTS (SUCH AS DECORATIVE ASPHALT PAVING, AND PERPENDICULAR TO SPEED BUMPS). EXISTING IMPROVEMENTS AND SPECIAL PAVEMENTS SHALL BE RESTORED IN KIND AS APPROVED BY THE CITY.
5. **DAMAGE TO EXISTING IMPROVEMENTS:** CONNECTION TO SERVICE LATERALS, JUNCTION BOXES, ETC. SHALL BE DONE SUCH THAT EXISTING IMPROVEMENTS ARE NOT DISTURBED, SETTLED, OR DAMAGED. ANY DAMAGE TO EXISTING IMPROVEMENTS BY PARALLEL OR PERPENDICULAR MICROTRENCHING ACTIVITIES SHALL BE RESTORED IN KIND AS APPROVED BY THE CITY. DAMAGE TO CONCRETE CURB, GUTTER, SIDEWALK, AND PAVEMENT SHALL BE REMOVED AN RESTORED IN ACCORDANCE WITH **SDG-156.**
6. **TRENCH CUTS:** CONTRACTOR SHALL MAKE ALL REASONABLE EFFORTS TO ACHIEVE STRAIGHT AND UNIFORM CUTS WITH NEAT EDGES. SELECTION OF CUTTING WHEEL SHALL BE SUCH THAT IT MINIMIZES DAMAGE TO THE ADJACENT AC SURFACE. RADII TRENCH CUTS SHALL HAVE NO MORE THAT 3 CUTS.
7. **MICROTRENCH WIDTH:** MICROTRENCH WIDTH SHALL BE A MINIMUM OF 1 INCH AND A MAXIMUM OF 2 ½INCHES. TRENCHES WITH WIDTH GREATER THAN 2 ½INCHES MUST FOLLOW **SDG-117** (NARROW TRENCH RESURFACING FOR ASPHALT CONCRETE SURFACE STREETS), WHICH REQUIRES A DIFFERENT BACKFILL MATERIAL. THE CITY MAY CHANGETHE PERMIT TO **SDG-117** BY AN AS-BUILT CHANGE IF THE TRENCH EXCEEDS 2 ½ INCHES IN CONSTRUCTION.
8. **MICROTRENCH ALIGNMENT OFFSET TO AN ADJACENT MICROTRENCH:** NO MICROTRENCHING SHALL BE LESS THAN 2 FEET FROM ADJACENT MICROTRENCHES (EDGE TO EDGE). THIS MAY REQUIRE THE CONTRACTOR TO POTHOLE TO VERIFY PARALLEL UTILITIES SIZE AND TRENCH WIDTH TO ENSURE PROPER SEPERATION.
9. **CONDUIT PLACEMENT IN TRENCH:** THE TOP OF HIGHEST CONDUIT SHALL BE 12 INCHES MINIMUM FROM TOP OF PAVEMENT OR 4 INCHES FROM BOTTOM OF PAVEMENT SECTION TO INCLUDE ASPHALT, BASE AND CTB, WHICHEVER IS GREATER.
10. **CONDUIT SIZE:** 2 INCH MAXIMUM CONDUIT SIZE SCH 40 PVC OR EQUIVALENT HDPE PER NATIONAL ELECTRICAL CODE.
11. **TRENCH IDENTIFICATION:** INSTALL FOLDED WARNING / IDENTIFICATION TAPE WARNING TAPE **PER SDM-105.** EACH TRENCH SHALL BE IDENTIFIED WITH A CALLOUT ON THE PULLBOX / VAULT / JUNCTION BOX LID WITH THE NAME OF THE OWNER OF THE MICROTRENCH.
12. **MICROTRENCH BACKFILL AND REQUIREMENTS TO OPEN THE STREET TO TRAFFIC:** ALL MICROTRENCHES SHALL BE COMPLETELY BACKFILLED WITH A CEMENT SAND SLURRY 2000 PSI MINIMUM AND 2% CALCIUM CHLORIDE TO FINISH GRADE. THIS IS AN INTERIM CONDITION AND CONTRACTOR SHALL FOLLOW CURING TIME REQUIREMENTS (PER NOTE 14) TO OPEN THE STREET TO TRAFFIC PRIOR TO COMPLETING PAVING REQUIREMENTS FOR FINAL RESTORATION.
13. **SLURRY VOID REDUCTION:** CONTRACTOR SHALL USE A VIBRATOR TO ENSURE SLURRY FILL WITHOUT VOIDS.
14. **SLURRY CURE TIME:** ALLOW A MINIMUM OF THREE HOURS FOR SLURRY TRENCH BACKFILL CURE TIME FOR TRENCHES PARALLEL TO THE STREET BEFORE OPENING TO TRAFFIC.
15. **FINAL MICROTRENCH RESTORATION:** WITHIN 7 DAYS OF PLACING THE SLURRY BACKFILL TO GRADE, MILL THE SLURRY BACKFILL AND EXISTING PAVEMENT A MINIMUM DISTANCE OF 6 INCHES ON EACH SIDE OF THE TRENCH, TO A DEPTH OF 4 INCHES AND RESURFACE WITH 1/2 INCH TYPE III CLASS C2 ASPHALT. TACK ALL EDGES OF THE MILLED AREA WITH ASPHALTIC EMULSION.

SEE ADDITIONAL NOTES ON SHEET 2

SHEET 1 OF 4

REVISION	BY	APPROVED	DATE
ORIGINAL	HY	M. GIBSON	05/17
REDRAFTED	CD	J. NAGELVOORT	09/18
UPDATED	RC	R. AMEN	10/22

CITY OF SAN DIEGO – STANDARD DRAWING

GENERAL MICROTRENCH NOTES

RECOMMENDED BY THE CITY OF SAN DIEGO STANDARDS COMMITTEE

Alaine James 10/10/22
COORDINATOR R.C.E. 81047 DATE

DRAWING NUMBER **SDG-165**

NOTES (CONTINUED):

16. **FINAL MICROTRENCH RESTORATION WHEN ADJACENT TO ANOTHER TRENCH:** WHEN RESTORING A MICROTRENCH SEPARATED BY 2 FEET (EDGE TO EDGE) FROM ANY ADJACENT TRENCH THE MICROTRENCH RESTORATION SHALL FOLLOW NOTE 15 FOR TRENCH RESTORATION AND **SDG-107** FOR FULL LIMITS OF THE PERMITTED ALIGNMENT TO MAINTAIN INFLUENCE AREA INTEGRITY.
17. **MICROTRENCHING IN BIKE LANES:** FOR THE WORK IN THE BIKE LANE, CONTRACTOR SHALL PROVIDE A POTHOLING PLAN FOR REVIEW WITH THE ENGINEER FOLLOWING PRE-CONSTRUCTION MEETING. THE BIKE LANE SHALL BE FULLY CLOSED AND APPROPRIATE TRAFFIC CONTROL PLAN AND SIGNAGE USED. MICROTRENCHING IN THE BIKE LANE REQUIRES THAT SLURRY BACKFILL BE COMPLETED BEFORE END OF APPROVED WORKDAY WITH CURING TIME PER NOTE 14. RESTORATION TO THE TRENCH SHALL BE PER NOTE 15.
18. **FINAL MICROTRENCH RESTORATION IN BIKE LANES:** THE CONTRACTOR SHALL RESTORE FULL WIDTH OF BIKE LANE TO THE FACE OF CURB AND PLACE 1 ½ INCH THICKNESS OF ASPHALT PER **SDG-107**.

SHEET 2 OF 4

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Key Features:

- Width – 1 to 2 ½”
- Conduit size- max 2” OD
- Use on AC Streets
- Separation btw wet/dry utilities based on CA Public Utility code
- Trench backfill- 2,000 psi slurry with 2% CC
- w/in 7 days place ½” AC 4” thick and 18” wide
- Trenching in bike lane then must pave full bike lane width

Standard SDG 165 PG 3 and 4

Key Features

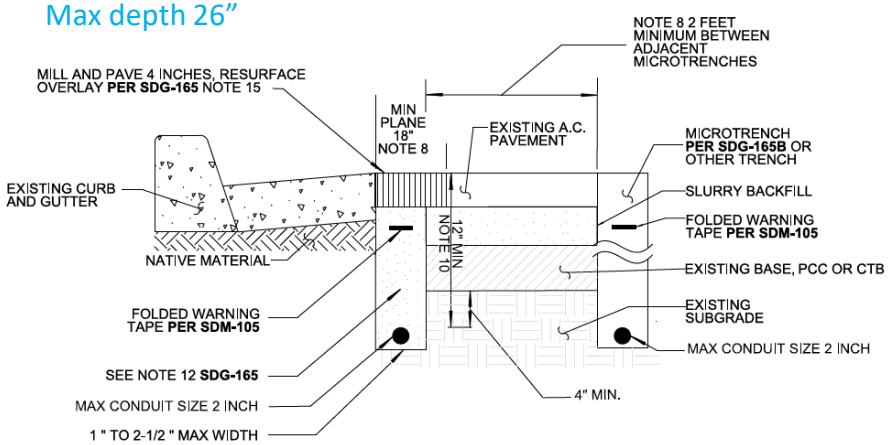
2 different locations

Along gutter or 9” and greater from gutter

Minimum distance is 2’ from adjacent trench

Minimum depth 12” to top of pipe and 4” from pavement section

Max depth 26”



LEGEND ON PLANS:

—MTC— MICROTRENCH CONDUIT (MTC)

NOTES:

1. APPLICABLE WHERE CONCRETE GUTTER IS VISIBLE OR EXPOSED.
2. SHALL NOT BE APPLICABLE AT STREET INTERSECTIONS OR ALONG MEDIAN CURBS.
3. TRENCH LOCATION SHALL BE AT THE EDGE OF CURB.

SHEET 3 OF 4

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CITY OF SAN DIEGO – STANDARD DRAWING

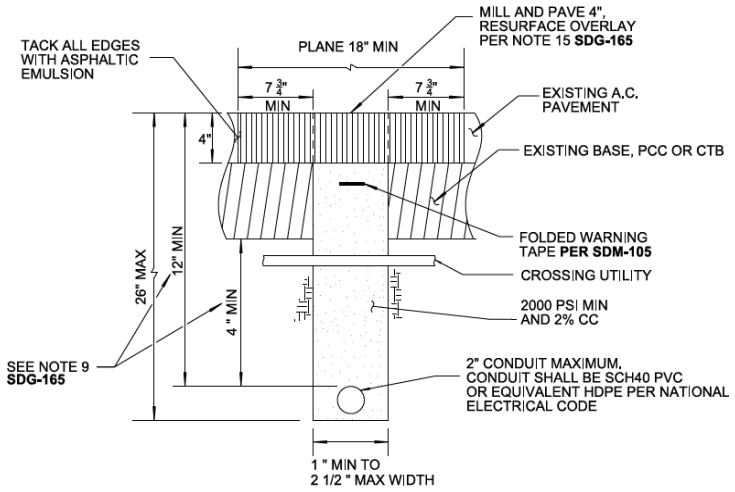
MICROTRENCH FOR DRY UTILITIES AT EDGE OF CURB AND GUTTER

RECOMMENDED BY THE CITY OF SAN DIEGO STANDARDS COMMITTEE

Alaine James 10/10/22

COORDINATOR R.C.E. 81047 DATE

DRAWING NUMBER **SDG-165A**



NOTES:

1. SHALL APPLY TO ALL MICROTRENCHING AT STREET INTERSECTIONS.
2. TRENCH LOCATION SHALL BE AT LEAST 9 INCHES FROM LIP OF GUTTER.
3. TRENCH SHALL BE AT LEAST 12 INCHES FROM ANY EXISTING CONCRETE STRUCTURE.
3. TRENCH LOCATION SHALL AVOID WHEEL PATH OF TRAVEL.

SHEET 4 OF 4

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CITY OF SAN DIEGO – STANDARD DRAWING

MICROTRENCH FOR DRY UTILITIES AWAY FROM EDGE OF CURB AND GUTTER

RECOMMENDED BY THE CITY OF SAN DIEGO STANDARDS COMMITTEE

Alaine James 10/10/22

COORDINATOR R.C.E. 81047 DATE

DRAWING NUMBER **SDG-165B**

Lessons Learned

1. Conflicting Interests: speed and ease of installation vs safety and protecting existing / future assets.
   - Stakeholders heard each others concerns, and all had to compromise
     - AMDs, DSD Permit Issuance Dept, Inspection Team, and ISPs
     - Depth compromise from 18" top of pipe to 12"
     - Separation from pavement section to top of pipe – compromise from 6" to 4"
2. The City conducted an interagency review of Microtrenching deployments and evaluations of key standard components.
   - Where to adjust the standard and still maintain adjacent asset integrity and safety?
   - What components are important to you that you won't compromise more on?
3. Reviewed 7 regional standards and extensively discussed the different agency challenges in GB Standard Plans Subcommittee:
   - Due to geological and previous development differences not every agency has same challenges.

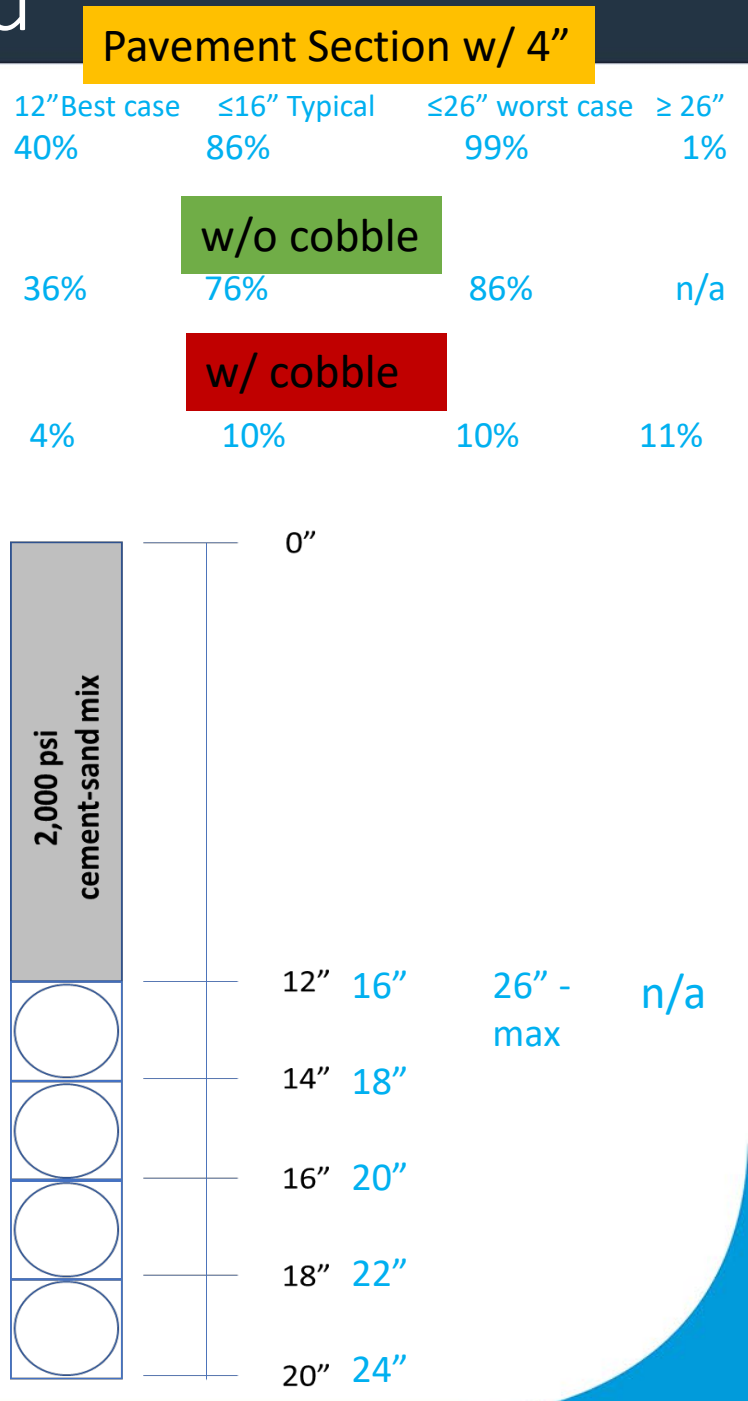
Cobble difficult to Maintain 2 ½" width and uniform edges, also broke equipment

Pavement thickness and separation clearance from top conduit – concern is pulling/breaking service for future trenching operations

Lessons Learned Continued

1. Spoke to ISPs and other agencies about clearance between street section and top of conduit
   - Original standard 6” clearance
   - ISPs and City of LA use 1” clearance
   - City 4” clearance to protect current and future adjacent asset
   - Reviewed coring data to see impacts of the depth

2. Cobble is an issue when encountered: Discovered during Pilot 2 the impacts created non-uniform edges, width of trench beyond 2 ½”and equipment breakdown
   - ISPs were concerned about production when cobble is present and if this standard would be profitable versus the narrow trench SDG 117 3” to 6” or SDG 119 Type 1 or Type 2 Trench 6” to 7’
   - The required minimum depth from the top of the pavement to the top of the pipe was adjusted from 18” to 12” so to help avoid cobble
   - Coring Data was reviewed to evaluate the frequency cobble was encountered
     - 1% of cores pavement exceeded 26” depth
     - 11% of cores encountered cobble
   - ISPs can determine use based on pothole observations and/or use of Geologist/Geotech




ANY
QUESTIONS?